Trend Study 17-6-96

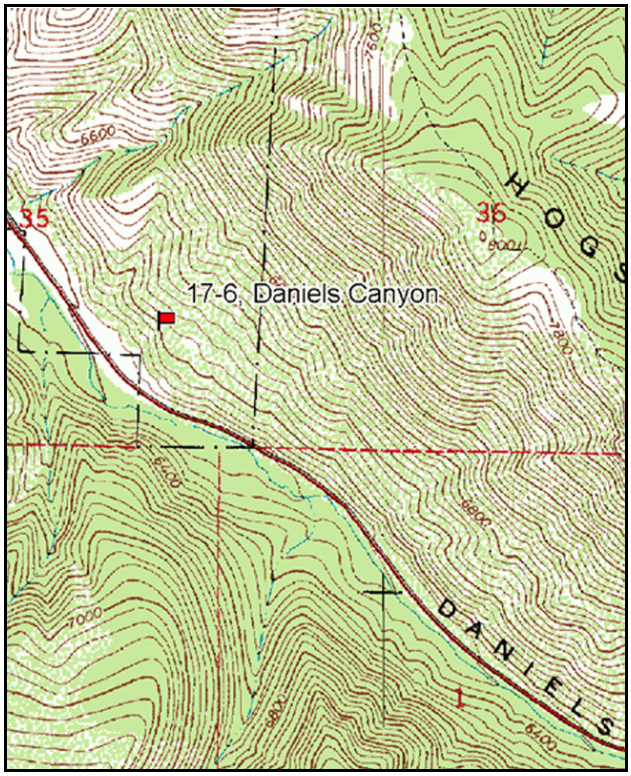
Study site name: Daniels Canyon . Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 27 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (71ft), line 3 (59ft), line 4 (34ft).

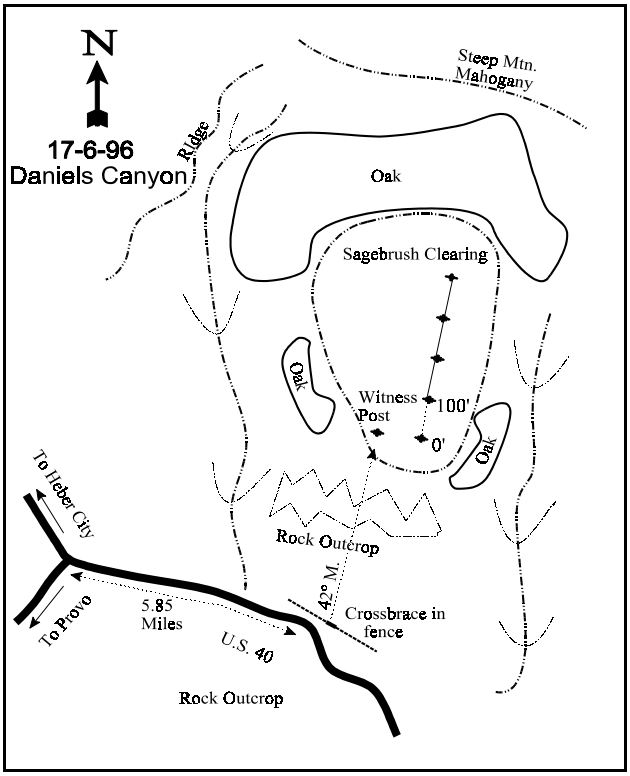
LOCATION DESCRIPTION

From the junction of U.S. 189 and U.S. 40 (southeast of Heber City), proceed southeast on U.S. 40 towards Daniels Pass for 5.85 miles, to mile marker 25. From mile marker 25, proceed towards Daniels Pass for and additional 0.25 miles and stop. Cross the fence on the northeast side of the road and walk 34 paces along the fence in a southeasterly direction until you reach a cross brace in the fence. From this point, proceed up the slope 140 paces at and azimuth of 42 degrees magnetic, to the witness post. From the witness post, walk at a bearing of 112 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline runs at an azimuth of 27 degrees magnetic. Line 2 runs at 13 degrees magnetic. Line 3 runs 21 at degrees magnetic. Line 4 runs at 22 degrees magnetic. The last baseline stake is 50 feet away. A red browse tag, number 3962, is attached to the 0-foot baseline stake.



Map Name: Center Creek

Township 4S , Range 5E , Section 35



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4474740 N 47182 E

DISCUSSION

Daniels Canyon - Trend Study No. 17-6

*** SUSPENDED - This study was suspended in 2002. It has been found not to be representative of the critical winter range in the area. The transect was placed in a small sagebrush opening that is surrounded by thick oakbrush.

This study is located on Division property in the lower portion of Daniels Canyon just above Highway 40. Elevation is approximately 6,200 feet and exposure is southwesterly on a moderate slope. Vegetationally, the site is occupied by a sagebrush-grass community surrounded by thick Gambel oakbrush. Numerous elk and deer pellet groups suggest heavy winter utilization. In 1996, one small buck was seen just north of the site and a cow elk was seen across the canyon.

Textural analysis indicates a loamy soil with a neutral pH. The average soil temperature is 48°F measured at 12 inches in depth. Some gravel is scattered throughout the horizon with larger rocks found on the surface. There is little bare ground and almost no erosion apparent. Vegetative cover is estimated to be 41%, most of which is contributed by annual species. Litter cover also comes primarily from annuals and is estimated to be nearly 58%. Rock and pavement cover combine to provide 22% cover. Bare ground cover is extremely low at an estimated 1%, thereby decreasing the erosion rate.

As in 1983 and 1989, evidence suggests winter use by deer and elk. The mountain big sagebrush is vigorous with some producing abundant seedheads this year. Many, however, have no seedheads and are moderately hedged. Fifty-six percent of the sage were classified as heavily hedged in 1989, as opposed to only 3% in 1996. Mountain big sagebrush age structure reveals a mostly mature population with very few seedlings encountered in 1996. The density appears to be stable and estimated to be 3,000 plants/acre in 1996.

Oak clones are scattered on the slopes with most being 4-8 feet in height. Some of the smaller oak plants are heavily hedged. The patches of oakbrush do not appear to be rapidly expanding. A few more oak plants were encountered in 1996 with the increased sample size. White-stemmed rubber rabbitbrush and stickyleaf low rabbitbrush may be slightly increasing in density on the site. These plants show no utilization and good vigor. The broom snakeweed density is estimated to be 2,500 plants/acre in 1996, which is much lower then the estimated 11,799 plants/acre in 1989. This population is mature with low biotic potential this season.

Sum of nested frequency for perennial grasses has increased since 1989, mostly due to Kentucky bluegrass and Sandberg bluegrass. Both species have significantly increased in nested frequency. Much of the herbaceous understory cover comes from two annual grasses, cheatgrass and Japanese brome. These species were not counted previously, but were reported as lush in 1983. Other grass species include Indian ricegrass, sand dropseed, bluebunch wheatgrass, and bulbous bluegrass. Perennial forb sum of nested frequency has declined since 1989, although it still higher then the initial reading in 1983. While the forbs are not abundant, there is a high diversity.

1983 APPARENT TREND ASSESSMENT

Soil condition appears to be declining. Overall, the site is poorly developed and eroded sufficiently to prevent any significant soil buildup. There is evidence of continuing erosion and soil loss. Vegetation is more difficult to assess. The key browse species, mountain big sagebrush, is healthy and moderately productive but may be threatened by other vegetative trends. Most obvious are the competitive influence of increaser shrubs and a depleted herbaceous understory.

1989 TREND ASSESSMENT

The soil trend is downward. Litter cover is less than half of the 1983 estimate. The trend for the key browse species, mountain big sagebrush, is declining due to lack of replacement of the increasingly decadent population. Heavy use increased to 56% of the population. These small sagebrush openings provide attractive forage on the winter range, but are limited in the oak-dominated canyon. The herbaceous understory has a slightly upward trend as sum of nested frequency values for both perennial grasses and forbs increased.

TREND ASSESSMENT
soil - down (1)
browse - slightly down (2)
herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

Because there is very little soil exposed, soil trend is stable at this time. Much of the litter protecting the soil is contributed by annual species and could easily be washed down the slope exposing the soil. Vegetative cover helps provide protection, but most is also contributed by annual species. The browse trend is stable with a vigorous mountain big sagebrush population. The broom snakeweed population can fluctuate highly from season to season and appears to have stabilized at 2,500 plants/acre since the 1989 estimate of 11,799 plants/acre. Herbaceous trend for perennial species is slightly downward with a decrease in sum of nested frequency. Annual species dominated the herbaceous understory and were not counted previously.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly downward (2)

HERBACEOUS TRENDS --
Herd unit 17 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'96	'83	'89	'96	'96
G	Agropyron intermedium	-	-	-	-	-	-	.03
G	Agropyron spicatum	2	5	10	1	3	4	.53
G	Bromus japonicus (a)	-	-	182	-	-	53	7.01
G	Bromus tectorum (a)	-	-	315	-	-	89	11.61
G	Oryzopsis hymenoides	a9	b29	ab19	4	11	10	.78
G	Poa bulbosa	-	-	1	-	-	1	.03
G	Poa fendleriana	-	4	-	-	3	-	-
G	Poa pratensis	a-	a1	b44	-	1	14	2.08
G	Poa secunda	a-	a2	b22	-	1	11	.30
G	Sporobolus cryptandrus	45	39	39	18	19	19	1.00
Total for Annual Grasses		0	0	497	0	0	142	18.63
Total for Perennial Grasses		56	80	135	23	38	59	4.76
Total for Grasses		56	80	632	23	38	201	23.39
F	Agoseris glauca	3	-	3	2	-	1	.15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'96	'83	'89	'96	'96
F	Alyssum alyssoides (a)	-	-	188	-	-	56	1.28
F	Antennaria rosea	-	-	-	-	-	-	-
F	Artemisia ludoviciana	34	31	59	14	13	24	1.34
F	Astragalus utahensis	-	1	3	-	1	1	.03
F	Calochortus nuttallii	5	6	-	3	3	-	-
F	Chaenactis douglasii	-	1	-	-	1	-	-
F	Cirsium spp.	$_{a}$1	$_{b}$17	$_{ab}$15	1	9	6	.59
F	Epilobium brachycarpum (a)	-	-	15	-	-	6	.03
F	Erodium cicutarium (a)	-	-	11	-	-	3	.18
F	Erigeron spp.	$_{a}$3	$_{a}$-	$_{b}$24	1	-	12	.18
F	Eriogonum racemosum	$_{a}$-	$_{b}$14	$_{b}$19	-	7	10	.27
F	Helianthus annuus (a)	-	$_{b}$41	$_{a}$-	-	21	-	-
F	Heterotheca villosa	$_{a}$8	$_{b}$23	$_{a}$5	4	9	3	.45
F	Holosteum umbellatum (a)	-	-	1	-	-	1	.00
F	Lactuca pulchella	-	4	3	-	3	2	.04
F	Lactuca serriola	14	-	-	7	-	-	-
F	Machaeranthera canescens	-	-	1	-	-	1	.03
F	Melilotus officinalis	$_{a}$-	$_{a}$-	$_{b}$20	-	-	9	.95
F	Oenothera albicaulis (a)	13	13	3	7	5	1	.03
F	Penstemon spp.	-	1	-	-	1	-	-
F	Phlox longifolia	-	2	-	-	1	-	-
F	Polygonum douglasii (a)	-	-	21	-	-	12	.08
F	Sphaeralcea coccinea	$_{b}$16	$_{a}$2	$_{a}$1	8	2	1	.03
F	Taraxacum officinale	-	1	-	-	1	-	-
F	Tragopogon dubius	$_{a}$37	$_{a}$13	$_{b}$71	19	9	40	.58
F	Trifolium spp.	$_{a}$-	$_{b}$63	$_{a}$-	-	30	-	-
F	Unknown forb-annual (a)	-	-	7	-	-	4	.07
F	Verbascum thapsus	-	3	-	-	1	-	-
F	Vicia americana	-	2	-	-	1	-	-
F	Viguiera multiflora	$_{a}$19	$_{b}$57	$_{a}$2	8	33	2	.01
Total for Annual Forbs		13	54	246	7	26	83	1.69
Total for Perennial Forbs		140	241	226	67	125	112	4.67
Total for Forbs		153	295	472	74	151	195	6.37

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 17 , Study no: 6

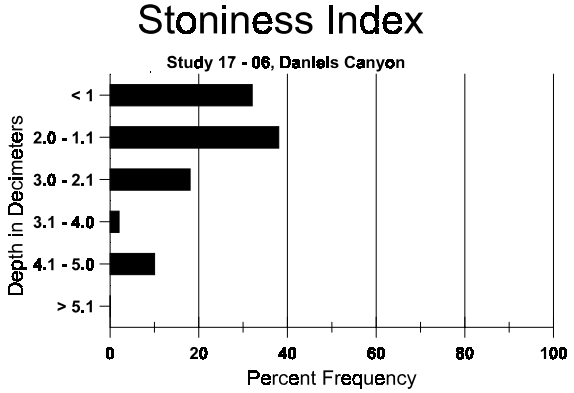
Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	61	10.36
B	Chrysothamnus nauseosus albicaulis	7	.18
B	Chrysothamnus viscidiflorus viscidiflorus	5	.15
B	Gutierrezia sarothrae	51	.77
B	Opuntia spp.	29	.55
B	Quercus gambelii	6	1.74
Total for Browse		159	13.77

BASIC COVER --
Herd unit 17 , Study no: 6

Cover Type	Nested Frequency '96	Av erage Cover % '83	'89	'96
Vegetation	391	3.00	7.00	41.45
Rock	262	12.75	18.00	14.23
Pavement	163	28.50	48.75	8.03
Litter	398	51.25	23.00	57.88
Cryptogams	6	3.25	0	.01
Bare Ground	80	1.25	3.25	1.31

SOIL ANALYSIS DATA --
Herd Unit 17, Study no: 06, Daniels Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.7	48.0 (11.9)	7.0	42.9	31.1	26.0	3.6	19.0	227.2	.3



PELLET GROUP FREQUENCY --
Herd unit 17 , Study no: 6

Type	Quadrat Frequency '96
Rabbit	8
Elk	24
Deer	23

BROWSE CHARACTERISTICS --
Herd unit 17 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	83	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	89	5	5	-	-	-	-	-	-	-	10	-	-	-	666			10
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
M	83	32	14	-	-	-	-	-	-	-	46	-	-	-	3066	14	17	46
	89	3	7	27	-	-	-	-	-	-	36	1	-	-	2466	12	13	37
	96	72	45	3	-	-	-	-	-	-	120	-	-	-	2400	17	33	120
D	83	1	7	-	-	-	-	-	-	-	8	-	-	-	533			8
	89	3	-	2	-	-	-	-	-	-	5	-	-	-	333			5
	96	7	12	1	-	-	-	-	-	-	18	-	-	2	400			20
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	33%	00%	00%	-19%
'89	23%	56%	00%	-13%
'96	38%	03%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	4265	Dec:		12%
'89	3465			10%
'96	3000			13%

Chrysothamnus nauseosus albicaulis																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66	41	39	1
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66	47	39	1
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	32	55	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+ 0%
'89	00%	00%	00%	+53%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	66	Dec:	-
'89	66		-
'96	140		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	3	-	-	-	-	-	7	-	-	-	140	9	19	7
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'96	140		-

Gutierrezia sarothrae																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	27	-	-	-	-	-	-	-	-	27	-	-	-	900			27
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	89	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	20	-	-	2	-	-	-	-	-	22	-	-	-	440			22
M	83	32	-	-	-	-	-	-	-	-	32	-	-	-	2133	14	15	32
	89	173	-	-	-	-	-	-	-	-	173	-	-	-	11533	8	9	173
	96	103	-	-	-	-	-	-	-	-	103	-	-	-	2060	8	11	103

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+81%
'89	00%	00%	00%	-79%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	2266	Dec:	-
	'89	11799		-
	'96	2500		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	10	-	-	-	-	-	-	-	-	10	-	-	-	333			10
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	8	-	-	-	-	-	-	-	-	8	-	-	-	533	7	10	8
	89	5	-	-	-	-	-	-	-	-	4	-	1	-	333	3	6	5
	96	35	-	-	-	-	-	-	-	-	35	-	-	-	700	4	8	35
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	-	-	-	-	-	-	-	-	1	-	-	1	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+27%
'89	00%	00%	12%	+ 4%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	533	Dec:	0%
	'89	732		9%
	'96	760		0%

Quercus gambelii																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	20	-	-	3	-	-	-	23	-	-	-	460	39	37	23
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'96	00%	82%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'96	560		-